Helmuth (W. T.)

THE PRESENT STATUS

OF

ANTISEPTIC SURGERY.

A PAPER READ DURING THE THIRTY-SIXTH ANNUAL SESSION OF THE AMERICAN INSTITUTE OF HOMŒOPATHY, HELD AT NIAGARA FALLS, N. Y., JUNE, 1883.

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THE PRESENT STATUS OF ANTISEPTIC SURGERY.

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The difficulties that surround that portion of the subject of antiseptics which has been assigned to me, can only be appreciated when one attempts to classify the opinions and experiments of those in the profession who have given attention to the subject, and to arrange systematically the vast amount of facts which for the past decade have been accumulating.

With the varied discussions relative to the germ theory and the labors of Pasteur, Schwan, Schroeder, Dusch, Roberts, Drysdale, Koch, Spina, Peter and many others, this paper has nothing to do, nor will its author undertake to detail the many very careful and prolonged experiments that have been made to ascertain the true nature of the micro-organisms that inhabit the atmosphere, (whose presence yet causes and has heretofore developed such disastrous effects during the treatment of wounds), only in so far as the opinions of the distinguished authors bear upon the question which forms the subject of this paper.

In the outset, then, we draw a distinct line of demarcation, between what is known as "*antiseptic surgery*" and "*aseptic surgery;*" the former being the treatment of all wounds by the best methods of preventing putrefaction and the consequent infectious diseases, the surgeon employing any of the so-called antiseptics in any way most in accordance with his opinion; while the latter (the "*aseptic method*"), will be considered as synonomous with "*Listerism*," the sheet anchor of which is Carbolic acid, and main-stay "complete occlusion of the wound."

The majority of surgeons at present, I think, are of the opinion that most if not entirely all germs come from without, either by the means of instruments, the hands of the operator, or by floating from the surrounding atmosphere, and that if these be perfectly excluded many complications will be avoided, perfect disinfection of the whole wounded surface and the complete exclusion of air being the two main conditions upon which the aseptic treatment rests.

There are three parties, however, at present in dispute regarding the *theory* of both the antiseptic and aseptic methods, and although all appear to agree that the introduction of the aseptic (Listerian) method, has been productive of a vast amount of good, the one side are disposed to believe that these results are obtained by simply care and cleanliness, while another attributes them to the distinctive power that Carbolic acid has upon bacteria, spores, micro-organisms and germs of all kinds, while again a third are of the opinion that the acid itself has some peculiar inherent power over the varied processes of repair.

There is, however, another point which is claimed by true antiseptic surgery, which exists in the fact that a really true antiseptic not only should exclude all septic ferments from the wound, but should be capable, (as Dr. Chein says in his "Antiseptic Surgery"), of rendering inert the *causes* of putrefaction.

Let us first, then, consider the *aseptic* method as briefly as possible. That the entire surgical world is indebted to Mr. Lister for the antiseptic method of treating wounds there can exist no doubt, and that following his example, and his teaching, most minute carefulness and perfect cleanliness have succeeded carelessness and filth, especially in hospital practice, is also well authenticated. That the results he has obtained in the treatment of wounds under his care are remarkable when compared to the older method, it is true. The practical value of his teaching in saving human life and preventing an immense amount of human suffering, is a fact which cannot be gainsayed. While, therefore, I think the majority of the profession at the present day are willing and ready

to accord to the aseptic method a vast practical improvement in its results, yet there is a wide difference of opinion regarding what I may term "Theoretical Listerism."

The first main proposition in this system is the perfect and complete acceptance of the germ theory of putrefaction, viz., that bacteria floating in the dust of the atmosphere not only infect the wounded surfaces, but enter into the tissues, deeply poison the whole mass of blood and produce rapidly those infectious diseases known as septic; that these micro-organisms are the *only* sources of putrefaction, and that Carbolic acid is the substance *par excellence* which is to be relied upon as most potent in preventing the entrance of these destructive bacteria, and offering obstacles more or less complete to the fermentations which these particles would otherwise occasion. This in a word is the theoretical Listerism, practical Listerism being the preparation of no less than twenty-one articles, which, as Mr. Chein in the Encyclopedia of Surgery says, will be necessary for each dressing. Many of the articles mentioned are in the plural, which in themselves cumber very materially the room and require a long time for their preparation and considerable expense for procuration.

The Theoretical Aseptic Method.

It is in this, as I have already said, that a wide discrepancy of opinion prevails, for while no one at the present day can deny the germ theory of certain diseases, (and it appears from very recent experiments that additional evidence can be adduced in its favor), yet many *do* deny that germs are the sole agents of putrefaction. I may here by way of parenthesis remark, that one of the best received and most carefully prepared works on the germ theory of disease has issued from the pen of my esteemed friend, Dr. Drysdale, of Liverpool, for a long number of years one of the editors of the veteran "*British Journal of Homœopathy.*"

The question now is, are there no other influences than the

presence of germs, to account for the obstreperous deportment of wounds, and does this bad behavior always arise, (as Mr. Lister and his followers strictly contend,) solely from the presence of bacteria?

In the "*Present Status of Antiseptic Surgery*," it can be shown without doubt, that these very bacteria instead of being in all cases hurtful are indeed beneficial, and while they may be in many instances the essential agents in fermentations, decompositions and putrefactions, at the same time may be important factors in the maintenance of health.

A large proportion of our food is prepared by saprophytes. To bacteria we are indebted for butter, cheese, vinegar and even bread; wines, beers and spirituous liquors. In fact, the tremendous influence of these organisms in consuming the waste thrown off from the animal and vegetable kingdom is indeed astounding; were it not for these, the *debris* would not be consumed, and would accumulate as a tremendous load upon the earth. Animals would be overburdened by their own excrement, and plants die for want of nutriment. Therefore, looking at the germ theory in this light, there is reason to doubt theoretical Listerism.

Again, certain varieties of bacteria, under peculiar circumstances, are absolutely of service in the process of repair. At the present time there are many renowned names who, I think, would give testimony in favor of such a statement.

Dr. Wm. Hunt, senior surgeon to the Pennsylvania Hospital, thus speaks: "Having noticed wounds *healing kindly under masses of maggots*, I reflected that they were scavengers, eating only dead materials and so converting harming matter into harmless living substance. We have to get rid of them, it is true, because they will persist in getting into *wrong* places, and so give an infinite amount of trouble. "*To my mind*," further says Dr. Hunt, and he italicizes the words, "*there is no positive proof as yet of the organisms being specific and primary in their operation*," and further on he says, and backs up his opinion by no less authorities than Formad and Dr. Joseph Leidy, "No micro-necrosis, no micro-maggots, that is food

mostly in the shape of necrotic products precedes the advent of the micro-organisms; however these may originate, whether animal or vegetable, and in disease these necrotic products, first, plus the micro-organisms, second; play havoc with their environment." Formad says, "The presence of baccilli (so far as our present research goes) is secondary, and appears to condition the complete destruction of the tissue already diseased and infested by them, and this destruction is in direct proportion to the *quantity* of the organisms which thus regulate the prognosis.

According to this view of the theory, bacteria are useful in some instances and hurtful in others, and a still more singular fact has been noted by Kocher, who says, "In different forms of inflammation different forms of organisms come into action, and the different changes in a wound cannot be laid to the same coco-bacteria." And again, our friend, Dr. Drysdale, also has proved that there is a specific parasite for almost every human tissue. Therefore, to account for *every variety* of septic poisoning by the presence of micro-organisms cannot at the present be tenable. And this may be proven by the fact that the most minute attention to all the details of Listerism does not completely exclude bacteria, for they have been found in the best dressed and healthiest wounds, even, I believe, in Carbolized catgut ligature; they have also been discovered in wounds proceeding rapidly to adhesion. "Billroth and Ehrlich, after careful experiments, declare that no difference is discoverable in the putrefaction of blood drawn directly from an artery and sealed up under spray and that taken without such protection." Besides, if mere bacteria acted as a pyæmic, poison as self-producing and in the minimal dose, like the poison of rabies, syphilis, and small-pox, nobody could survive the smallest cut or abrasion, and vaccination and subcutaneous injection would be certain death. (Drysdale, p. 45). As Dr. Hunt also says, if these organisms are specific and primary, "I do not comprehend how any of us are alive."

Dr. Bryant also writes in his latest work, "I am no convert as yet to the *theory* on which it (Listerism) is based, nor to the

great value of the special practice based upon it, neither is it yet proved. It is much to be regretted, that the originator of the system should not have listened to the repeated requests of surgeons to publish the results of his practice as a whole, since it can be by such alone that the value of the method is to be estimated." (Bryant's Surgery, p. 972).

And again, Markoe, of our country, in a valuable paper on "*Thorough Drainage in the Treatment of Wounds*," (AMERICAN JOURNAL OF MEDICAL SCIENCES, April, 1880, p. 309), says that though he is a firm believer in many of the most important doctrines connected with the germ theory, that he certainly is of opinion that there are very many other causes which may excite "the ill-behavior of wounds."

Dr. Lawson Tait, (*American Journal of the Medical Sciences*, July, 1882, p. 267), writes; "The basis of Lister's theory of putrefaction by means of bacteria had long ago been proved beyond dispute as regards dead matter. But Mr. Lister assumed for living matter the same sequence of events as in the case of the dead."

Again, it has been proven that symptoms in appearance, progress, duration and results exactly similar to septicæmia have been produced by introducing fibrin ferment into the blood in considerable quantities, that Pepsin and Ptyalin produced similar symptoms, and from these facts Dr. W. T. Bellfield, in his valuable Cartwright Lecture, states positively that recent experiments have demonstrated "that the ætiology of the growth of clinical and anatomical appearances known as septicæmia is by no means restricted to putrid infection." (*Medical Record*, March 3, 1883, p. 227).

These references are sufficient to show that there are wide differences of opinion regarding the theoretical aseptic or Listerism methods; let us look to that which concerns us more closely, viz.: the practical results of the method.

Those at all conversant with surgical literature must at once acknowledge that Mr. Lister has roused the medical and surgical world to the proper application of thorough disinfection and perfect cleanliness, and by his most praiseworthy and per-

severing efforts has wrought a complete revolution in the treatment of wounded and abraded surfaces. The most skeptical as to the THEORY are compelled to acknowledge the beneficial results of the practice, and I think I may say that in private or in hospital routine work at the present day, any surgeon would appear derelict in his duty did he not employ some variety of the antiseptic method.

The details of the Listerism, however, as I have already stated, are cumbersome and trying both to the patience and to the time of the surgeon, and therefore many of the minutiæ, which at one time were deemed essential, are now omitted altogether or applied in a very modified form with most excellent results. Notably is this the case in the application of the spray, which has been not only abolished by many, but by some is deemed absolutely hurtful.

Lister, himself, has modified his opinion with regard to the strength of his Carbolic acid solutions, using first a spray of 1 to 100, and now 1 to 20; for sponges, a solution of 1 to 40, and it is stated by Delacroix that 10 per cent. of Carbolic acid is *required* to destroy bacteric life. It may be said, therefore, that as there are means of causing putrefaction other than the bacteria floating in the dust of the atmosphere, and as (as already has been stated), different inflammations are attended by different forms of bacteria, and as the resistant power of bacteria is not always the same, (that of the reproductive spores being much greater than fully developed bacterial product), and as also as Dr. Weir writes, "it must be admitted by the most devoted advocates of the Listerian system, that the dressings applied with the strictest attention not infrequently fail in arresting the progress of putrefaction,"—that the good results so widely acknowledged, must be explained by other than the Listerian theory. Again, Kocher, Volkman's assistant, is of opinion *that the same antiseptic measures cannot be used in the treatment of all varieties of wounds*, (VOLKMAN'S KLINISCHE VORTAGE, November, 1882), and the same surgeon writes after fully admitting that many wounds heal well by the Carbolic acid treatment says, "I have seen colleagues who

tenaciously hold to the spray with all the attributes which hold to the Lister-Volkman technique, have here and there the most grave cases of infection after complicated operations;" and as Drs. Hunt and Formad have stated that in many instances the micrococci seem to be increased in the proportion to the necrosis of the tissue; may it not be a fact that Carbolic acid (as indeed do many medicinal substances), has a peculiar action upon certain forms of bacterial life, in the one case causing the total annihilation of the organisms, in another but partially affecting them, while perhaps in a third variety they resist the action altogether? In other words, a specific action of Carbolic acid is found in one class of cases, and, perhaps, these are in the majority, while in another, it is of no avail.

In looking over Mr. Chein's late work on "*Antiseptic Surgery*," and comparing Mr. Lister's own statistics, it will be found that the best and most surprising results were obtained by Mr. Lister in his method of treating diseases of the joints. Why, then, as different micro-organisms belong to different inflammations and tissues, may not Carbolic acid be particularly applicable to those affecting the synovial tissues of joints?

Again, there are other thoughtful men, who believing, in a measure, as I do myself, in the bacterial agency in the production of putrefaction, who see in the good results that are often observed from the use of Carbolic acid, something more than the mere destruction of baccilli, give a large share of the efficiency of the drug to its action upon the tissues themselves.

Dr. Markoe, says, (*American Journal of the Medical Sciences*, April 1880, p. 314), " my attention once directed to this point, I think I have verified this power which I claim Carbolic acid possesses, of modifying vital action in many striking instances. I have watched many commencing surface inflammations rapidly diminish and disappear under Carbolic dressing, *when no exclusion of germs was attempted.* I have seen wounds of all kinds and degrees of severity go through their stages of repair without a trace of inflammatory complication, and even when

inflammatory complications had not been prevented. I have seen the morbid actions which threatened infinite mischief, so modified and controlled by Carbolic acid constantly applied as to be practically robbed of their usual power to inflict damage." It is needless here to note the opinions of Ollier, Tillaux, Weir, Beal, and others, but I may say that these views have been for the past six years entertained by myself, indeed, since the perusal of a paper by John Dougall, M.D., of Glasgow, on "The Relative Power of Various Substances in Preventing the Generation of Animalculiæ, or the Development of their Germs with Special Reference to the Germ Theory of Putrefaction," I immediately endeavored to look for some other power in Carbolic acid in the treatment of wounds beside its virtues as a mere germicide. In his paper, Mr. Dougall says, "If, as is alleged, germs are the source of putrefaction, then the strongest preventions must be the best antiseptics, and *vice versa*. Now, as seen in the table, Carbolic acid occupies a very mediocre place, * * * * * * and although unable to formulate the change that takes place, when it unites in large proportion with organic bodies, for which it has a strong affinity still, the result of such change *certainly is the* formation of a compound capable of resisting the attacks of oxygen, of water, and consequently of germs. In other words, a compound is formed which is proof against putrefactive tendencies."

If, now, we take also into consideration the valuable experiments of Prudden (*American Journal of Medical Sciences*, January, 1881, p. 96), which appear to show that strong solutions of Carbolic acid cause immediate cessation of amœboid motion and death of the cells, and that very dilute solutions may cause a temporary cessation of the movement *and not the death of the white blood-corpuscles*, it would appear that the physiological action of Carbolic acid may have a great deal to do with the results which have been obtained by its use in the treatment of wounds. It would be interesting to enter upon the details of "*Carbolic acid poisoning*," but as a paper on that subject is to be prepared by a very able gentleman, I shall not venture upon it in this place.

Antiseptic.

Having now given a passing consideration to the aseptic method, we come to examine the second division of the subject, viz., "The Present Status of Antiseptics."

Here at once a wide field opens to the student, and a cursory glance at medical literature for the past three or four years will show beyond cavil, that the universal antiseptic has not yet been discovered, nor will such a *panacea lapsorum*, in my mind, ever be revealed. I have no doubt, however, that the time will come when a more thorough understanding of the actions of the so-called antiseptics will be arrived at, and that the surgeon may then be enabled to select certain drugs or certain chemicals which, beside having antiseptic properties, may be peculiarly adapted to the process of repair as taking place in the different structures of the human body.

I think it may be affirmed at the present that while the aseptic or Listerian method, or certainly portions of it, which were formerly deemed essential, are gradually being done away with. Yet that antiseptic treatment is being more thoroughly investigated. This may be judged even by a cursory review of the treatment of wounds in hospitals as well as in private practice.

The spray, I think, is almost abolished in the majority of hospitals, and many antiseptics, other than Carbolic acid, are employed by surgeons in all parts of the world. It is well known that Mr. Savory, senior surgeon to St. Bartholomew's, the largest of the London hospitals, rejects the antiseptic treatment and relies upon cleanliness alone, and very ably has defended his position, although Mr. Chein, in his late work, states that the Savory treatment was in some degree antiseptic.

Mr. Lawson Tait, as has already been mentioned, is no advocate for the antiseptic method in ovariotomy, and we find in the *American Journal of the Medical Sciences*, so late as January this year, 1883, a most surprising record, viz., the record of one hundred *consecutive* cases of ovariotomy performed without any Listerian details, of which but *three* died, and one of these

from accidental suffocation, which really ought not to be classed in the mortality. His increased success Mr. Tait attributes to the improved methods of operating, to his more extended experience, and especially the *complete abandonment of the use of Carbolic acid or any other disinfectant*, and the establishment of hospital discipline and hygiene on the best known principles.

Bantock, also of the Samaritan Hospital, operates without spray. (*Medical Record*, March 10th, 1883).

Dr. Keith, (*Lancet*, August 13th, 1881), it is well known, spoke his mind in the surgical section of the London Congress when he said, that after having a succession of eighty successful cases, he had five deaths in the next twenty-five cases, two of which were from carbolic poisoning, one from septicæmia, and two from acute nephritis. He had abandoned the spray in all operations, and in the last twenty-seven ovariotomies without any antiseptic treatment, he had lost but one patient.

Holmes, at St. George's Hospital, discards the use of antiseptics except in disease in the joints.

Hutchison, at the London Hospital, also works without Listerism.

In the hospitals in New York they are constantly investigating substances with a view of ascertaining their antiseptic properties, the spray being in very many of the institutions entirely abolished, and even by some considered as being pernicious. Sands, Stimson, Markoe, Wier and many other surgeons are, in the hospitals to which they are attached, constantly experimenting with the newer dressings, some of which as bearing upon the subject of this paper will be mentioned shortly. In Bellevue Hospital the dressing is as follows, as communicated to me by my former pupil, Dr. Fuller, now house surgeon in that institution: He writes me, "The form of dressing now in use in our wards is one introduced by Dr. Lange, and is practically the antiseptic dressing that is being used in Germany almost entirely. The wound dressing, however, is only one element in the treatment of the case, the secret is absolute cleanliness and antisepsis. Say the case is one of

amputation, or excision of a joint, the parts are first washed with soap and water, with Ether, if necesary, and the hair shaved off. Then towels wet with an antiseptic solution, *generally* 1-40, Carbolic acid, are spread around, the limbs so that the operator's hands or the instruments may not touch the parts unnecessarlly. Instead of a spray the wound is frequently irrigated with a solution of Corrosive sublimate, four grains to the pint of water, the instruments are absolutely clean, and are lying, when not in use, in a solution of 1-40 Carbolic acid. The hands of those engaged in the operation are wet with the same. For ligatures we use Carbolized catgut or fine Carbolized silk. We keep it in pots wound in spools. In an amputation we use absorbable drains of decalcified bone, in other cases, rubber tubes. After the final washing, the wound is sprinkled with Iodoform and protected by rubber tissue, which is placed over the sutured margins of the wound, and the outside dressing is then applied, it may be peat, borated cotton, or gauze. Peat is the best absorbent, but is expensive. We generally dress within thirty-six hours. When the oozing of blood and serum will have ceased, the tubes are then removed or not, according to circumstances. This dressing must be made under the same precautions as the operation, irrigation, guards, etc. The second dressing may remain on a week or longer. If the discharge comes through the outside dressing, the part is to be dusted with Iodoform, or an extra amount of cotton, or gauze applied. The only indication for the removal of the entire dressing is a higher temperature. With this dressing we have treated in the last two months over a dozen excisions of joints, half a dozen osteotomies, excisions of tumors, compound fractures, etc., without a bad result, and with a remarkably low range of temperatures. In all the wards we do not treat antiseptically, but there have been no results to equal these I speak of. Dr. Weir tried full Lister dressing with good results; Dr. Keys also. Dr. Wood used the open method entirely. Dr. Lange employs the one I have just mentioned."

In a late number of the *Medical News*, June 13th, 1883, Dr.

Henry C. Simes, assistant surgeon to the Episcopal Hospital, thus writes of the general treatment of wounds in the Philadelphia hospitals. He says that Listerism is far from being accepted, and thus continues, "In this city (Philadelphia) I know of no hospital in which its surgeons have fully and thoroughly carried out the details necessary to give their treatment the name of antiseptic, that is to say, that they have not attended to the minute directions, and in many cases the principal features have been omitted;" and then further states, that in the same hospital, when antiseptically treated cases were compared with those not subjected to the method, the results of the former were much more satisfactory.

From these facts, selected from an immense amount of material, it may be judged that antiseptic surgery, as we now regard it, is being more thoroughly investigated and improved, while the minute details of Listerism are being gradually abolished.

The constant search for new antiseptics in the treatment of wounded surfaces, may be regarded as indicative of the fact that there are none which have as yet proved entirely satisfactory, and as much has been written and many experiments made during the past three years in regard to new substances said to be antiseptic in their nature, it would be scarcely proper in a paper on "the present status of antiseptics" not to allude in a concise manner to some of these materials.

Iodoform.

This substance, Iodoform, must take the precedence, not only because it has been very much used by many distinguished surgeons, but because the results obtained have been very surprising. In fact, I recollect reading not very long since, that Billroth had stated that the reason that he had not published his cases treated with Iodoform, was that the results he had obtained were so very surprising that he feared they would not be credited.

Iodoform contains about 96 per cent. of Iodine, and when decomposition is going on, the Iodine is evolved, which, by

actual experiment, has been proved to be one of the best disinfectants.

After the wound has been cleansed, the powder of Iodoform may be dusted over the part, and covered with a piece of protective. This substance is very useful in parts of the body where Carbolic acid could not be applied, as in cancers of the rectum, tumors of the tongue and mouth.

Billroth made twelve consecutive amputations of the tongue, and treated the wound with Iodoform without any fatal result. Dr. Sands, (*Medical Record*, March 25th, 1882), of New York, mentions cases of strangulated hernia, trephining for fracture of the skull, colotomy, enterotomy, castration, ligature of the external carotoid, peri-nephritic abscess, enucleation of suppurating inguinal glands, excisions of the breast, amputations, all of which made prompt recovery, treated with Iodoform.

Among the German surgeons, especially Esmarch, Pillroth and Langenbeck, the use of this drug has produced surprising results—out of thirty-four resections thirty-two were cured with a dressing once applied and allowed to remain thirty-five days. Billroth's method of applying Iodoform is to powder the wound thickly with the substance, or, in some instances, to fill it; surround this with a piece of cotton wool or Iodoform gauze, then a water-tight dressing is put on and held in position by a bandage. From a paper entitled, "The use of Iodoform in the London Hospitals" (*Medical Record*, April 15th, 1882), we read that it is a favorite dressing in almost every institution. It must, however, be borne in mind, that Iodoform is highly poisonous, although the Iodine is taken up slowly; indeed Kœnig, of Gottengen, has published a special warning on this subject, and, therefore, the dressing ought not to be allowed to remain for over five days, and then for a time some other antiseptic should be employed.

The symptoms of Iodoform poisoning chiefly show themselves in intoxication of varying degree and intensity, and often in mental derangement. It can be detected in the urine by adding starch and Nitric acid and shaking well, when the blue color will appear. The lethal dose for a guinea pig is

three grains, in rabbits forty-five grains, in the dog one drachm, and in man according to his susceptibility to the drug. But this subject has already been fully considered by others in the bureau.

Bi-chloride of Mercury.

Corrosive sublimate in dilute form is employed more especially by some of the metropolitan surgeons. I have employed it in amputations, resections, and the removal of tumors with excellent, but not very surprising results. ··

Delacroix uses it in one part to 2525 of water, and Dr. Weir and Sands in about 1-2000, but of this Weir says, bacteric life was found under such dressings, and therefor, following the experience of Kümmel and Schede, of Hamburg, he used it stronger and with a uniformity of good unknown to Listerism.

In preparing this dressing, the sponges, compresses, etc., are wet with solution No. 1 (as it is called), consisting of 8 grains to the pint. The ligatures are made of silk dipped for two hours in a solution of 8 grains to the pint, and catgut immersed in 8 grains to the pint of water for 12 hours, then rolled on bobbins and kept in an Alcoholic solution of 20 grains to the pint. The gauze is prepared by immersion in a solution of 20 grains to the pint of Alcohol with ℥iss of Glycerine.

It has been found by Koch that the anthrax spores, the most resistant of all varieties, were completely destroyed by moistening the parts with one to five thousand of water, and if immersed for a longer period, a solution of one to twenty thousand parts was sufficient for their destruction.

Turf Dressing.

As Dittle discovered the elastic ligature by accident, so Neuber, two years since, recorded the case of a man brought to his clinic who had sustained a wound and fractures of both forearms, ten days before; a comrade had surrounded the wound with a turf mould, and upon its removal the cut surfaces were

found healing beautifully. It has since been discovered that the dust resulting from the sawing of the turf into moulds possesses a very great affinity for Ammonia, Carbonate of Ammonia, and odors generally, and in the infantry barracks at Brunswick, the turf mould is used to disinfect privies, etc.

This dust, beside being a great diisnfectant, possesses wonderful absorbent properties, *taking up nine times its weight in water.* A great many experiments have been tried regarding its efficiency as an antiseptic dressing with satisfactory results. The turf mould is used as follows: Bags are made of two sizes, 12 and 24 centimetres square. The turf dust is placed in these, the smaller one having besides 2½ per cent. of Iodoform. This is laid on the wound, which has also been disinfected; over this the larger bag is lain, the mould of which is saturated with a five per cent. solution of Carbolic acid.

Its absorbent powers, its cheapness—a pennyworth being sufficient for a dressing—and its antiseptic virtues, render it an excellent dressing in those countries where the mould is readily obtained, and so much has been said of its efficiency that it is now being used by surgeons in this city, and I am informed with most excellent results.

The Per-oxide of Hydrogen.

The Per-oxide of Hydrogen has received very great eulogiums from many and varied quarters, and C. T. Kingsett, of London, made a report of a series of experiments with the material in 1876. In 1878, Güttman and Fraenkel, in Germany; and Baldy, Best, and Regnard in France made many demonstrations of the value of the material, and under the name of "Eau oxygene" it has been widely used. It is employed as spray, as a washing for wounds, ulcers, etc., and is devoid of all odor. Kingsett has lately announced a preparation called "Sanitas oil," which he claims to be an organic Per-oxide, which will continually yield Per-oxide of hydrogen to water, on being placed in contact therewith. If placed on surfaces it is said to keep them in a completely antiseptic atmosphere.

There are a great many other of the so-called disinfectants and antiseptics, among which may be mentioned Boracic and Salicylic acids, Eucalyptus oil, by Bassini, (*Medical News*, February, 1881). Resorcin, which belongs ta the Phenol group, and has been noticed especially with reference to its substitution for Carbolic acid, (*American Journal of Medical Sciences*, January, 1883).

Naphthalin, which according to Fischer, of Strasbourg, is superior to Carbolic acid, (*Glasgow Medical Journal*, November, 1882).

And the Sub-nitrate of Bismuth, which Kocher claims as a new and better antiseptic than any yet discovered, (*Volkman's Klinische Vortage*, No. 224, 1882). He discards drainage tubes and closes the wound its entire extent by suture.

During the operation the parts are sprinkled with water holding Bismuth in solution. The wound is then closed by suture and the line of incision covered with Bismuth paste. Then the dressings wet with Bismuth water are applied.

As the sutures are removed, Bismuth is again applied; this method is called healing by second adhesion, but there have been also some drawbacks to this substance when applied to extensive abraded surfaces: if Bismuth in powder was largely employed, it was found to produce diarrhœa, nephritis, stomatitis and other disturbances; it was then employed in a solution of 10 per cent., and sprinkled on the parts with great benefit. The astringency of Bismuth is said also to add to its effective healing powers.

Oxidized Oil of Turpentine.

This is announced as a valuable antiseptic (*Lancet*, 1881, page 971). It is prepared by passing air for a long time through the ordinary Oil of turpentine. Mr. Lister was said to be experimenting with the substance, but as no report has as yet been given, it is reasonable to suppose that the results were not as satisfactory as Mr. C. T. Kingzett had anticipated.

Chloral hydrate.

This substance has also been used in Russia, with benefit, as an antiseptic, especially in the treatment of ulcers and open wounds. Dmitrieff demonstrated in St. Petersburg, that an equal quantity of one per cent. solution of Chloral hydrate destroyed in twenty minutes all mobility of the bacteria in a putrefying infusion of flesh.

But a sufficient number of these substances have been enumerated to show, as I have already stated, that as yet all of them have some disadvantages. It is my belief, as already stated, that there must reside in any application made to a wounded surface, something beside its germ-killing properties, which after all are merely mechanical. I am justified in asserting that because a substance is really a germicide, is no reason that it is a perfect vulnerary. There must reside in the drug a power to act upon the leucocytes, to either hasten their amœboid motion to the cut surfaces of the capillaries, which are endeavoring to repair waste or to retard this very migration, and by so retarding, prevent the dying of the leucocytes, which in the majority of instances means their conversion into pus. While on this subject I must say, as far as I have observed by actual results in the treatment of wounded surfaces —for I have never given any microscopical trial to ascertain its value as a germicide—that the Calendula officinalis has given me equal, if not better results than Carbolic acid, and while I acknowledge the fact, that since the "bacteria craze," and the "Carbolic excitement," I have yielded to the popular cry and used Carbolic acid in different proportions and in different solutions, yet I am convinced, that other things being equal, that Calendula, from its peculiar action on suppurating surfaces, is a medicine that sooner or later must receive the attention which its virtues deserve. I am quite sure of the following facts, that in the past five years, when I have been employing Carbolic acid preparations upon wounded surfaces, that have not appeared to be progressing as favorably as I thought they should, I have substituted Calendula with surprising

results. In many cases of breast amputations and large wounds, I have employed merely cleanliness and the solution of Calendula, one per cent. to four of water, with a most satisfactory termination of the cases.

In conclusion, it is most important to look at the results of antiseptics in surgery—and this also must be briefly considered, although on this point, viz., the welfare of humanity, the whole subject must rest.

First, I will note MacEwen's cases, because they were treated in Glasgow, where Mr. Lister began his investigations and treatment; and second, because the experiments were made under the pre-conceived idea that hygienic treatment was all-sufficient in the treatment of wounds. In the years 1875, 1876, 1877, 1878 (five years), there were 1706 cases treated by aseptic method of which fifty died, giving a mortality of 2.93 per cent. During the same period, in the same number of wards, Dr. Morton treated 1884 cases without aseptic precautions and of these 110, or 5.84 per cent., died.

After Mr. Lister went to Edinburgh, from the end of 1871 to the middle of 1877, a period of about five and a half years, Mr. Lister treated aseptically 553 cases, of which 29 cases died. Mr. Spence, during the same time (five and a half years) was operating in the same hospital, using no very decided treatment—sometimes water dressing, sometimes Boracic lint, and sometimes none whatever. In the 328 cases operated upon with 58 deaths, showing again a large percentage in favor of the antiseptics.

Again, if we turn to Mr. Lister's figures, after he had changed his residence from Edinburgh to London, where, in King's College Hospital, from November, 1877, till November, 1880, a period of three years, he performed 207 operations, of which 14 died, a fair estimate of his success may be arrived at. As these last were performed by Mr. Lister after he had studied and improved upon his method for a period of thirteen years and in three hospitals, the results as bearing upon the present status of antiseptic surgery, are of the utmost importance, and therefore it may be well to mention the character and kind of operations performed. Thus:—

There were three amputations of the hip-joint for disease, with one death. There were four amputations of the thigh for disease, of which three died. There were two amputations of the fore-arm, no death. There were sixteen excisions of the mamma, with two deaths. There were thirty-one operations in healthy bones for deformity, no deaths. There were eight abscesses, with one death. There were four cases of strangulated herniæ, with three deaths. There were three operations for the radical cure of herniæ, no death. There were three cases of acute necrosis, and one death. There were twenty-three large abscesses, no death. Two cases of empyema, no death. There were also cases of nerve stretching, castration, varicocele and tumors.

From a careful examination of these cases, it will at once be seen that in the same hospitals, with the ordinary run of cases, with the same surroundings, and in the same atmosphere, the percentage in aseptic treatment is almost double in its favor. This fact cannot be gainsayed, but we must *now* consider whether the aseptic method, Listerian in theory and practice, the Carbolic acid treatment in its minute details, gives better results than the ordinary antiseptic methods as employed without the Listerian minutæ by the majority of the profession at the present day. This is difficult to accomplish, and about the best way for me to place the subject properly is to give the statistics of the Hahnemann Hospital. These figures I have copied from the case book, and extend over a period from September, 1878, to June, 1883, being four and three-fourths years.

Among these were 17 amputations of the breast, and 1 death. There were 15 amputations, 1 of the thigh, 5 of the leg, 3 Symes, 2 Pirogoff's, 1 Choparts, 3 fingers, with 1 death. There were 3 excisions of the rectum for cancer, with 1 death. There were 2 cases rectotomy, no death. There were 9 resections: tibia, 3; ankle joint, 1; elbow, 1; wrist, 1; coccyx, 1; ribs, 2, with no death. There were 11 ovariotomies, with 4 deaths. There were 17 abscesses, some of very large size, and no deaths. There was 1 case of empyema, and 1 death. Laceration of the perinæum 22, with no death. External

urethrotomy 11, with 1 death. There were 2 cases of internal urethrotomy, no death. There were 9 cases of lipoma, some of large size, no death. There was 1 fistula of the thorax, 1 vesico-vaginal fistula, 1 recto-vaginal fistula, 1 perineal fistula. There were 2 cases of Battey's operation, no death; 2 cases cystocele, no death. There were 9 rhinoplastic operations, 1 death. There were 3 cases of supra-pubic lithotomy, 1 death. There were 5 cases of lithroty, no death. Removal of superior maxillary 2 cases, no death. There was 1 extirpation of the uterus, 1 death. There were 56 cases of laceration of the cervix, no death. Besides these were 10 cases of hernia, 16 cases of fistula in ano, varicocele, tracheotomy 1 each, and others, making a sum total of 201 operations performed in the Hahnemann by the visiting surgeons, with the loss of 11 cases. There is no absolute Listerism practiced at the hospital, but antiseptics are used in the shape of Carbolic acid solutions, the instruments carbolized, and Calendula, Balsam of Peru, the Bichloride of mercury or any other antiseptic used that the operator may deem proper. One feature in the dressing is the *Marine lint*, which I regard as an agent of the greatest value. The parts to be operated upon are washed with Carbolized solution, the floor of the operating room is scrubbed, and the "ovariotomy room also ventilated and disinfected after each operation" The instruments are first laid in Carbolized oil over night, and then in shallow pans containing Carbolic acid. An assistant is at hand to immediately wash an instrument which has been laid aside and replace it in the pan. Sponges are immersed either in a solution of Corrosive sublimate, 1 to 2500, or in Carbolic solution 1 to 60. The wounds are closed with silver sutures carbolized. The silk is rendered aseptic and catgut is often employed. Salicylated India rubber plaster is the only kind used in the house, and after it has brought the edges of the wound in contact, a wad of Marine lint is laid over the entire wound, spreading some distance around it, over this the protective gauze, and again over that a bandage is placed. These dressings are not touched until some indications for their removal is noticed, and often remain

in position for days together. It will be seen, therefore, that our statistics without the minutiæ are even better than that of Mr. Lister.

If, now, we compare all these statistics, we can formulate the present status of antiseptic surgery:

OPERATOR AND LOCATION OF HOSPITAL.	CASES.	DEATHS.	PER CENT.
GLASGOW.			
McEwen, 5 years..... Aseptic Treatment.	1,706	50	2.93
Same Hospital.			
Morton, 5 years..... Non-aseptic Treatment.	1,884	110	5.84
EDINBURGH.			
Lister, 5½ years..... Aseptic Treatment.	553	29	5.2
Same Hospital.			
Spence, 5½ years. .... Non-antiseptic.	328	58	17.7
LONDON.			
Lister, 3 years..... Aseptic Treatment.	207	14	6.76
NEW YORK.			
Hahnemann Hospital, 4 years.....	201	11	5.47

So it will be found that in most hospitals the aseptic treatment, viz., Listerism, is abolished or greatly modified, and that the *anti*-septic treatment will probably give as good results as the *a*-septic, especially with proper hygienic surroundings.